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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
VJAYAKUMAR, KALLAMBELLA M				
ART UNIT		PAPER NUMBER		
1793				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/544,227

Applicant(s)

TERUI ET AL.

Examiner

KALLAMBELLA VIJAYAKUMAR

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 5-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 5-11, 13-19 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

- Claims 1 and 5-19 as amended are currently pending with the application. Claims 1, 8-10 were amended. Claims 2-4 cancelled. New claims 11-19 were added.

Response to Arguments

- Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

- The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1, 5, 7-11, 13 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al (US 6,432,325) in view of Terui et al (JP 09-270240), Terui et al (JP 2001-325910) and Mehrotra et al (US 5,744,905).

Hamada et al teach a hot cathode type electron gun for ultra LSI and electron microscopes containing an electron-emitting electrode (122; Fig-21) made of a tungsten wire coated with the emitter material that meets the limitation of W/Mo needle in the claims 1 and 9 (Cl-18, Ln 1-24; Fig-21). The emitting material comprised a first metal component selected from Ba, Sr, and Ca and mixtures thereof, and a second material component selected from Ta, Zr, Nb, Ti and Hf and mixtures thereof (Abstract, Cl-4, Ln 11-27; 47-58). The first metal component possessed low work function while the second component reduced the resistivity and increased the melting point of the emitting material (Cl-14, Ln 17-21). Barium and Ta and/or Zr were the preferred elements in the composition and a typical composition included Ba-Ta-Zr oxides (Cl-20, Table-1; Samples 1, 3 and 5). BaZrO_3 is encompassed by the composition with the formula $\text{M}^{\text{I}}\text{M}^{\text{II}}\text{O}_3$ type crystals formed from the preferred elements of Ba and Ta/Zr. Further, $(\text{Ba}, \text{Sr}, \text{Ca})(\text{Ta}/\text{Zr})\text{O}_3$ is encompassed by the same formula when Ba is partly substituted by Sr and/or Ca, because the prior art is suggestive of using a mixture of these elements (Table-III). The electrode is capable of its use as hot cathode or thermionic action produced a higher luminescence with extended life i.e. high-density/improved-characteristics and low-deterioration/extended-life (Cl-13, Ln 28-30). The electrode is typically used as an electrode in a discharge lamp, electron gun, gas discharge panel, field emission display, fluorescent display tube or electron microscope (Cl-2, Ln 37-41).

The prior art fails to teach the electrode to be a single crystalline W-wire/needle per claims 1 and 9 comprising specific complex oxides, and shaped electrode per claim-5. The prior art is silent about the operating parameters per claim-7 and electrode characteristics per claim-9.

In the analogous art, Mehrotra et al teach the Ba₂Sc₄O₉, BaAl₂O₄, BaTiO₃ and BaZrO₃ to be equivalent emission materials in discharge lamps (Title; Cl-5, Ln 15-20).

In the analogous art, Terui et al (JP-910) teach a flat face electron emissive cathode comprising single crystals of W [100] as well as spherical shaped electrode for electron guns with high electron density. The electrodes could be operated at high angular velocities by choosing the appropriate shape of the electrode (Claims 1-3, Fig-1; 0003, 0009, 0020, 0023). The electrode operational temperature was between 900-1500K (P-0015).

With regard to claims 1, 5, 11 and 13, it would have been obvious to a person of ordinary skilled in the art to substitute the emission materials of Hamada et al with those of Mehrotra as functional equivalent because Mehrotra teaches them to be equivalents in the analogous art; and further substitute the electrode design of Hamada et al (US- 325) with flat tipped electrode of Terui et al (JP -910) as functional equivalent to benefit from high electron density with predictable results and reasonable expectation of success because the teachings are in the analogous art of electrodes for electron guns and Hamada is concerned about the a higher luminescence/density.

With regard to claims 7-8 and 15-18, the prior art teaches using the electrode in a SEM and electronic beam apparatus <claim-8> that are used as surface analytical tools including wafer inspection, and the claimed operating parameters in claim-7 would have been obvious to a person of ordinary skilled in the art over optimizing the operating parameters of the equipment as

a choice of design of the electrode use, because they have similar composition, structure and utility as electron source, and such use and optimization is well known in the art (See Terui et al, JP 2001-325910; Abstract; P-0004, 0020, 0021, 0023).

With regard to claims-9-10, the prior art teaches using an electron gun containing the prior art electrode in an electron microscope, and claimed method of its use would be obvious. The instant claimed needle temperature in the prior art composition would be obvious because prior art composition, structure and utility are similar to that by the applicants and similar compositions are expected to possess similar properties/characteristics. Further, the combined prior art teaching of 900-1900K for the operating temperature of the electrode (JP -210, P-0015) overlaps with instant claimed range of 1000K – 1300K, In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

2. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al (US 6,432,325) in view of Terui et al (JP 09-270240), Terui et al, (JP 2001-325910), Mehrotra (US5,744,905) and Nishiyama et al (JP 10-154477).

The disclosure on the composition and structure of a thermal field emission cathode by Hamada et al (US-325) in view of Terui et al (JP -240) , Terui (JP-910) and Mehrotra (US-905) as set forth in rejection-2 under 35 USC 103 (a) is herein incorporated.

The prior art fails to teach the flat tip with a <211> plane per claim-6.

In the analogous art, Nishiyama et al (JP-477) teach an electron source for electron beam apparatus comprising a needle like electrode of W/Mo with an orientation of [100] or [211] coated with mixed oxides of alkaline earth metals. The electrode provided high electron density and operated at 1000K or less after an heat treatment of at least 1500K (Abstract; Claims 6-9; P-0006, 0009; 0002). Applicants acknowledge this as prior art that uses (Ba, Sr, Ca) oxide as the coating material (See Spec. Pg-6, Ln 3-11).

It would have been obvious to a person of ordinary skilled in the art to substitute the flat tipped electrode of Hamada et al (US-325) and Terui et al (JP -910; JP-240) with electrode material of Nishiyama et al (JP -477) as functional equivalent to benefit from high electron density with predictable results and reasonable expectation of success because the teachings are in the analogous art of electrodes for electron guns and Hamada is concerned about high luminescence.

3. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al (US 6,432,325) in view of Terui et al (JP 09-270240), Mehrotra et al (US 5,744,905) and Komiya et al (US 6,124,667).

The disclosure on the composition and structure of a thermal field emission cathode by Hamada et al (US-325) in view of Terui et al (JP -240), Terui et al, (JP 2001-325910) and Mehrotra (US-905) as set forth in rejection-2 under 35 USC 103 (a) is herein incorporated.

The prior art fails to teach the specific emitter per claim-14.

In the analogous art, Komiya et al teach the Ba₂Sc₄O₉, BaSc₂O₄, BaTiO₃ and Ba₃Sc₄O₉ to be equivalent emission materials for electron guns (Title; Cl-6, Ln 6-11).

It would have been obvious to a person of ordinary skilled in the art to substitute the emission materials of Hamada et al with the scandates of Komiya as functional equivalent with predictable results and reasonable expectation of success because the teachings are in the analogous art of electrodes for electron guns and Hamada is concerned about the a higher luminescence/density.

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hamada et al (US 6,432,325) in view of Terui et al (JP 09-270240), Mehrotra et al (US 5,744,905) and Billings (US 5,911,919).

The disclosure on the composition and structure of a thermal field emission cathode by Hamada et al (US-325) in view of Terui et al (JP -240), Terui et al, (JP 2001-325910) and Mehrotra (US-905) as set forth in rejection-2 under 35 USC 103 (a) is herein incorporated.

The prior art fails to teach the specific emitter per claim-19.

In the analogous art, Billings teach electron emitting material containing BaTiO₃, BaHfO₃, BaZrO₃ for thermionic electrons and their use in lithography and X-ray generation (Title; Abstract, Cl-1, Ln 6-15; Cl-4, Ln 13-16; Cl-5, Ln 5-16).

It would have been obvious to a person of ordinary skilled in the art to use the electron emitter of Hamada et al in the lithographic machine at the time of the disclosure of the invention by the applicants with predictable results and reasonable expectation of success, because emission materials of Hamada et al overlap with the emission materials of Billings and the teachings are in the analogous art.

Allowable Subject Matter

- Claim 12 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record neither teaches nor fairly suggest an electron source comprising the specific emitting material and the structure.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KALLAMBELLA VIJAYAKUMAR whose telephone number is (571)272-1324. The examiner can normally be reached on M-F 07-3.30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 5712721358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KMV/
Dec 06, 2008.

/Stuart Hendrickson/
Primary Examiner, Art Unit 1793